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REPORT OF THE PINE BEETLE SURVEY

ON THE

MT. HOOD NATIONAL FOREST

SEASON OF 1940

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April 18, 1941

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Portland, Oregon

SUBJECT-

INDEX No.-

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Approved by

*F. P. Keen*

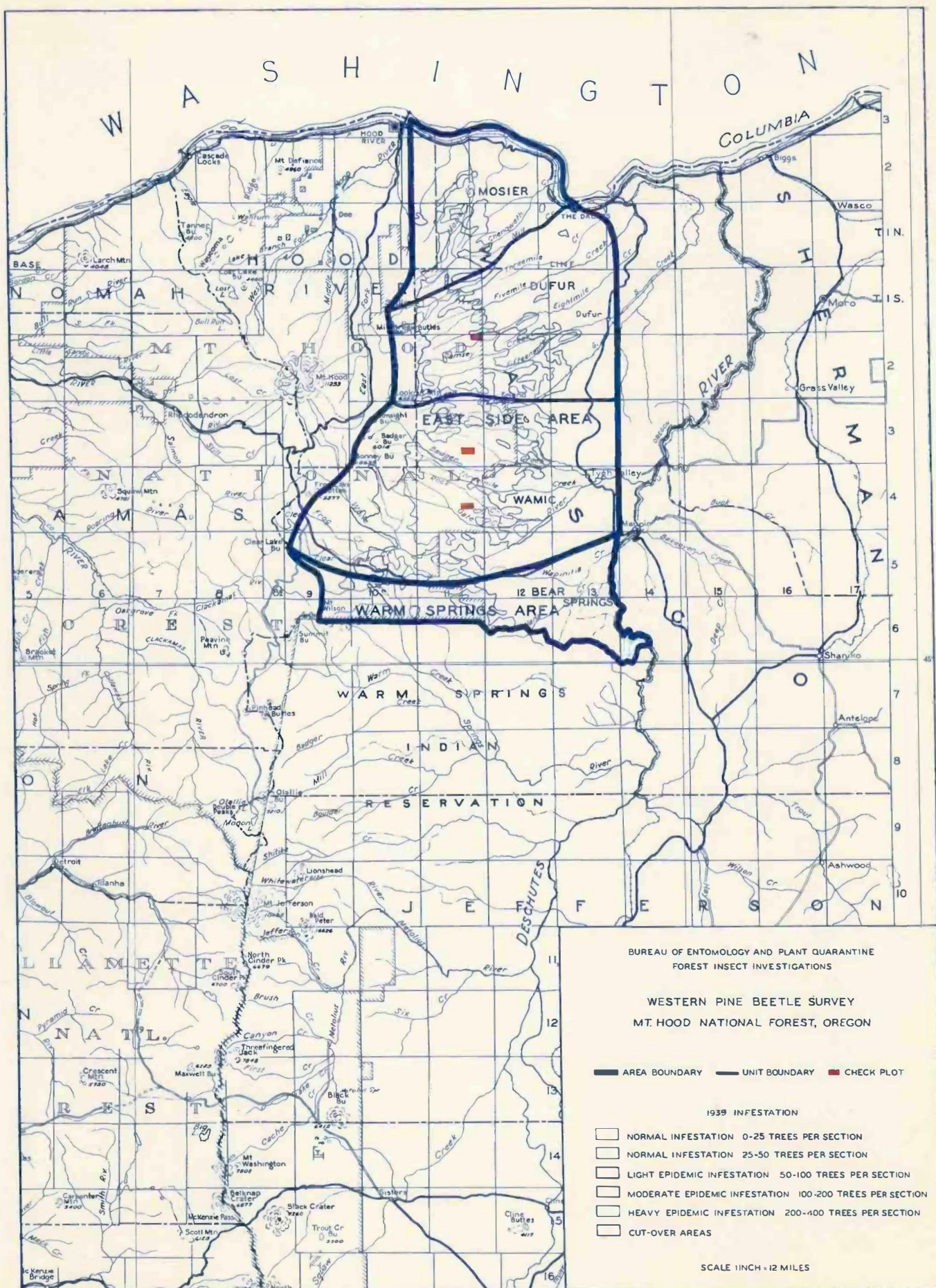
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## Introduction

As part of the regionwide bark beetle survey program, systematic surveys of insect conditions in the ponderosa pine stands within and adjacent to the Mt. Hood National Forest (except Indian lands) were begun in 1937 and have been carried on annually since then. These surveys have been conducted through the cooperative efforts of the Bureau of Entomology and Plant Quarantine and the Forest Service.

The purposes of these surveys are many fold, the more important of which are (1) to follow the yearly trend, intensity, and distribution of a group of destructive insects commonly called bark beetles, of which the western pine beetle (*Dendroctonus brevicornis* Lec.) is the most important; (2) to ascertain the necessity of control work and to study the results of such work as was undertaken; (3) to determine the type of tree most susceptible to beetle attack and the areas of high beetle hazard warranting first consideration in timber management plans.

The 1940 pine beetle survey was carried out during the period September 27 to October 1.

This survey was conducted along the same intensive-extensive plan as previous surveys. The intensive phase was carried on by a crew of three field aides, F. E. Kinney (crew leader), G. A. Beckin, and G. W. Summerside, and consisted of making a 100 percent cruise of current beetle losses on three 320-acre check plots. A description of these plots is given in Table No. 1. Their locations on the forest are shown on Map No. 1.

The writer gave the crew technical supervision and also carried on the extensive phase of the survey, which consisted of making an observational reconnaissance of the pine type covering some 215,360 acres, having a commercial volume of approximately 1,156,350,000 board feet.

From the combined data of these methods estimates were made of the probable loss occurring in the pine stand during 1939. These losses, amounting to some 11,700,000 board feet, are given by areas and units in Table No. 3. The intensity and distribution of these losses are graphically shown on Map No. 2.

### Past Losses

About 1930 the effect of prolonged drought was resulting in reduced tree growth and greatly lowered vitality of the pine stands in this area. Under these conditions the western pine beetle thrived and multiplied, became epidemic during 1930, continued to increase through 1931, and reached disastrous epidemic proportions in 1932. This upward trend was checked during the winter of 1932-33 by extreme subzero temperatures that caused 61 1/2 percent mortality to overwintering broods of the pine beetle. As a result of this high mortality the infestation began to decline and subsequent periods of low temperatures that also caused some mortality served to reduce the infestation to a low point in 1936. Losses, however, remained much above normal. During 1937 the infestation again assumed an upward trend.

### Recent Losses as Shown by the 1940 Survey

The 1940 survey completed the 1939 loss data on the check plots and gave preliminary information on the 1940 loss trend. These data are given in Table No. 2. As less than 75 percent of the 1940 loss had developed by the time of the survey, the probable total was estimated by employing a factor developed from past surveys. Although somewhat inaccurate, its use does give a fair indication of the probable 1940 loss.

Infestation trends on check plots for the three-year period 1938-40 are presented in Table No. 3. These data show that the infestation which was at a high level in 1937 continued to increase throughout the three-year period. Losses on the plots mounted from 171 board feet per acre in 1938 to an estimated 312 board feet per acre in 1940--an increase of 55 percent. Cumulative losses since the plots were established in 1937, including the estimated 1940 loss, are as follows:

<u>Plot Name</u>	<u>Percent of 1937 Stand</u>	<u>Board Feet Per Acre</u>
Eight Mile	9.7	710
Happy Ridge	8.0	942
Burnt Mill	9.2	700

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Low Temperatures as a Limiting Factor in Western Pine Beetle Epidemics. F. P. Keen, Entomologist, and J. A. Beal, Assistant Entomologist. April 20, 1933.

General Infestation Conditions During 1939-40

During 1939 the infestation on the poorer sites at low elevation remained more or less static but in 1940 showed signs of increasing. In many portions of these marginal sites the stands have become so badly decimated that increases of infestation are no longer possible.

The movement of infestation into the better stands at higher elevations became pronounced during 1939-40. This was especially noticeable in the north portion of the area where a center of heavy epidemic developed on the Dufur unit.

The center of heavy epidemic on the Wanic unit continued to maintain itself during the past season. Losses on the remainder of the forest also continued at an abnormally high level.

Some idea of the extremely adverse conditions under which the pine stands of the forest are trying to survive will be gained from the precipitation records taken at the Dufur station of the Weather Bureau, which is some 12 or 15 miles east of the timber stands. While the annual precipitation here averages only 13.94 inches, the average in the forested areas undoubtedly is greater. However, the departures from normal at the Dufur station should be indicative of the departures from normal in the pine stands. The present drought cycle became critical about 1928 and the yearly departures from normal since then are as follows:

<u>Year</u>	<u>Departure in Inches</u>
1928	-2.59
1929	-6.00
1930	-6.50
1931	-3.10
1932	-3.98
1933	-3.49
1934	-2.90
1935	-7.52
1936	-2.94
1937	+1.56
1938	-3.23
1939	-7.75
1940	+1.66
Total Departure	-46.33
Percent Deficient	25

The drought conditions in the marginal stands at low elevation soon became critical to tree growth. As the trees became weakened, they were soon killed by the western pine beetle. The continuation of the drought resulted in large areas being badly decimated, and rendered worthless as logging chances. In some instances the losses were so severe that the timber boundary retrogressed a mile or more. As the drought conditions continued, increasingly better stands began to suffer. It is in these stands that the recent heavy losses are occurring. At the moderate elevations these stands are rapidly approaching the condition prevailing in the marginal stands.

The effects of the continued drought are now becoming apparent in the stands at the higher elevations. Losses are becoming increasingly severe, extending to the upper limits of the ponderosa pine type.

#### Recommendations

In the survey report of 1937-38 it was pointed out that the solution of the present insect problem in the pine stands of the forest was believed to be one of timber management rather than direct control, as many trees appear unable to recover from effects of recent severe drought conditions and fall easy prey to the attacks of bark beetles.

Again it is recommended that a sanitation-salvage cut be taken to include all high beetle hazard trees. In the light of past experience, this type of beetle control has proven successful not only in reducing beetle infestation but in recovering positive values from the salvaged timber. Unless some such steps are taken or a definite change for the better in climatic conditions occurs, the present high level of losses can be expected to continue, with the resultant depletion of stand, loss of values, accumulation of snags, and increase of fire hazard.

#### Summary

The fourth annual western pine beetle survey was conducted during the period September 27 to October 1, 1940.

Plot data show that the upward trend assumed by the infestation during 1937 and continued to increase through 1938-39 into 1940.

During the three-year period losses on plots increased 55 percent from 171 board feet per acre in 1938 to a probable 312 board feet per acre in 1940.

During 1939-40 the infestation continued its migration into the better stands at higher elevation.

A new center of heavy epidemic developed on the Dufur unit. The heavy epidemic present on the Wamie area continued to maintain itself through 1939-40.

Selective logging of high beetle hazard trees is again recommended as the best means of relieving the critical infestation conditions on the forest.

Table No. 1. Description of Check Plots

Areas and Units	Plot Name	T.S.	R.E.	Sec.	Elevation	Type	Site	Pine Timber Acres	Pine Volume as of Jan. 1, 1939	Board Feet per Acre
<u>Dufur</u>										7300 w.b.
Dufur	8 Mile Creek	2	11	1N	3,000	21	4	320	2,331,005	<del>6,900</del>
Wamic	Happy Ridge	3	11	26S	2,750	20.5	4	320	3,690,975	11,500
	Burnt Hill	4	11	23S	2,250	20.5	4	320	2,383,560	7,400
Total	3 Plots							960	8,405,540	

Table No. 2. Summary of Ponderosa Pine Losses on Check Plots  
Survey of 1940

Areas and Plots	1939 Loss					:	1940 Loss						
	First Marking			Total			:	First Marking			Estimating Factor	Estimated Total	
	Date	Trees	Volume	Trees	Volume			Date	Trees	Volume		Trees	Volume
<u>Dufur</u>													
8 Mile Creek	9-13	28	13,860	95	47,500	:	9-27	173	98,930	72	240	130,700	
<u>Wanig</u>													
Happy Ridge	9-12	88	68,245	112	79,995	:	9-30	110	87,830	75	147	104,400	
Burnt Mill	9-11	45	31,000	100	56,060	:	10-1	99	34,500	75.5	131	65,200	
Total		161	113,105	307	183,555	:		382	221,260		518	300,300	

Table No. 3. Recent Infestation Trends on Check Plots

Year of Loss	1938								1939								1940 Probable Loss							
	Trees Bd.Ft.				Ratio				Trees Bd.Ft.				Ratio				Trees Bd.Ft.				Ratio			
	Trees	Volume	per	per	% of	1938 to	Trees	Volume	per	per	% of	1939 to	Trees	Volume	per	per	% of	1940 to	Trees	Volume	per	per	% of	1940 to
Area and Plot	Killed	Bd.Ft.	Sec.	Acre	Stand	1937	Killed	Bd.Ft.	Sec.	Acre	Stand	1938	Killed	Bd.Ft.	Sec.	Acre	Stand	1939	Killed	Bd.Ft.	Sec.	Acre	Stand	1939
						:						:						:						:
<u>Dufur</u>						:						:						:						:
						:						:						:						:
8 Mile						:						:						:						:
Creek	57	31755	114	99	1.36	1.86	:	95	47500	190	148	2.13	1.50	:	240	130700	480	410	5.60	2.70				
						:						:						:						:
<u>Wamie</u>						:						:						:						:
						:						:						:						:
						:						:						:						:
Happy Ridge	111	72225	222	226	1.96	1.59	:	112	79995	224	250	2.17	1.11	:	147	104400	294	326	2.83	1.31				
Burnt Mill	115	60000	230	188	2.52	1.46	:	100	56060	200	175	2.35	.93	:	131	65200	262	204	2.74	1.17				
						:						:						:						:
Total	283	163980	149	171	1.95	1.64	:	307	183555	205	191	2.18	1.12	:	518	300300	345	312	3.57	1.63				
						:						:						:						:

Table No. 4. Estimated Ponderosa Pine Losses for 1939

Areas and Units	Ponderosa Pine Acreage		Volume of Pine M.B.M. Jan. 1, 1939	Estimated 1939 Loss				
	Total	Virgin		Trees	Volume M.B.M.	Trees per Sec.	Bd. Ft. per Acre	Percent of Stand
<u>East Side</u>								
Mosier	26,000	19,000	88,850	600	300	15	12	.34
Dufur	61,060	38,060	291,300	5,300	2,900	55	48	1.00
Wamic	90,600	83,600	600,000	11,100	6,700	78	74	1.12
	177,660	140,660	980,150	17,000	9,900	61	56	1.01
<u>Warm Springs</u>								
Bear Springs	37,700	31,700	176,200	3,280	1,800	56	48	1.02
Total	215,360	172,360	1,156,350	20,280	11,700	60	56	1.01

